US006483250B1

(12) **United States Patent**
**Hashimoto et al.**

(10) **Patent No.: US 6,483,250 B1**
(45) **Date of Patent: Nov. 19, 2002**

(54) **METHOD OF DRIVING PLASMA DISPLAY PANEL, PLASMA DISPLAY DEVICE AND DRIVING DEVICE FOR PLASMA DISPLAY PANEL**

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( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/715,124**

(22) Filed: **Nov. 20, 2000**

(30) **Foreign Application Priority Data**

Feb. 28, 2000 (JP) ..... 2000-051601

(51) **Int. Cl.**[7] ..... **G09G 3/10**

(52) **U.S. Cl.** ..... **315/169.4**; 345/41; 345/42; 345/60

(58) **Field of Search** ..... 315/169.4, 169.1, 315/169.3; 345/41, 42, 55, 60, 76, 78, 208, 211

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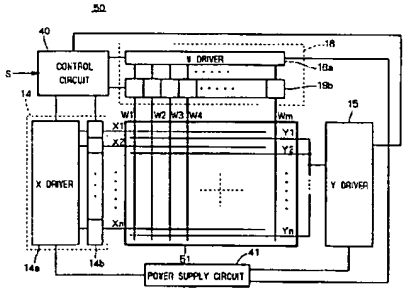
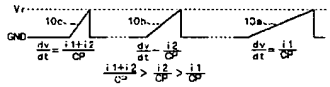
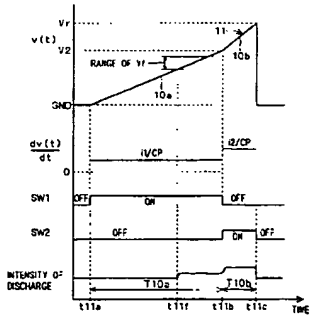
(57) **ABSTRACT**

A synthetic round pulse generation circuit can output constant currents (i1, i2). By charging a capacitance element (CP) with the constant currents (i1, i2), a ramp pulse (**10***a*) having a rate of voltage change of i1/CP and a ramp pulse (**10***b*) having a rate of voltage change of i2/CP are applied to the capacitance element (CP). A synthetic round pulse (**11**) consists of the ramp pulse (**10***a*) and the ramp pulse (**10***b*). In the synthetic round pulse (**11**), the lengths of application time periods (T**10***a*, T**10***b*) are set so that a discharge is started with the ramp pulse (**10***a*). Further, the rate of voltage change (i1/CP) of the ramp pulse (**10***a*) is set to a small value so that the intensity of the discharge at a discharge starting time (t**11***f*) in the application time period (T**10***a*) may be sufficiently weak. When a PDP is driven with the synthetic round pulse, it is thereby possible to reduce an application time of the round waveform.

**7 Claims, 14 Drawing Sheets**



18*a* thereof corresponds to the driving unit. Further, the synthetic round pulse **11** or the like may be applied to a plurality of electrodes.

Furthermore, the above discussion also applies to a case of a PDP having a structure in which the first and second electrodes are opposed to each other with the discharge space sandwiched therebetween (so-called a counter two-electrode type PDP).

While the invention has been shown and described in detail, the foregoing description is in all aspects illustrative and not restrictive. It is therefore understood that numerous modifications and variations can be devised without departing from the scope of the invention.

What is claimed is:

**1**. A plasma display device, comprising:

a plasma display panel comprising a discharge cell including a first electrode and a second electrode; and

a driving unit for driving said discharge cell by giving a potential difference between said first electrode and said second electrode,

wherein said driving unit generates a voltage pulse and outputs said voltage pulse as a voltage to be applied to said first electrode, said voltage pulse continuously changing from a first voltage to a second voltage and containing a portion at which a rate of voltage change increases in voltage range above a firing voltage with which discharge starts in said discharge cell.

**2**. The plasma display device according to claim **1**, wherein

said driving unit comprises a pulse generation unit capable of generating a voltage pulse by using a first pulse generation system and a second pulse generation system, and

said voltage to be applied to said first electrode includes a first region which is generated by said first pulse generation system and contains said firing voltage and a second region which is generated by said second pulse generation system and occurs after said first region.

**3**. The plasma display device according to claim **1**, wherein

said pulse generation unit generates said voltage pulse by further using a third pulse generation system different from said first pulse generation system, and

said driving unit generates said first region between said second region and a third region different from said first and second regions, said third region being generated by said third pulse generation system.

**4**. The plasma display device according to claim **1**, wherein

said voltage pulse includes part of one of a CR voltage pulse, a ramp voltage pulse, and an LC resonant voltage pulse.

**5**. The plasma display device according to claim **1**, wherein

said driving unit further comprises a power recovery unit, and

said driving unit generates said voltage pulse by utilizing a reactive power recovered in said power recovery unit.

**6**. The plasma display device according to claim **1**, further comprising:

a plasma display panel comprising a discharge cell including a first electrode and a second electrode; and

a driving unit for driving said discharge cell by giving a potential difference between said first electrode and said second electrode,

wherein said driving unit generates the voltage pulse, which continuously changes from the first voltage to the second voltage and changes more sharply as the voltage pulse approaches said second voltage, to output said voltage pulse as a voltage to be applied to said first electrode.

**7**. A driving device for a plasma display panel, said plasma display panel comprising a discharge cell including a first electrode and a second electrode, comprising:

a driving unit for driving said discharge cell by giving a potential difference between said first electrode and said second electrode,

wherein said driving unit generates a voltage pulse and outputs said voltage pulse as a voltage to be applied to said first electrode, said voltage pulse continuously changing from a first voltage to a second voltage and containing a portion at which a rate of voltage change increases in voltage range above a firing voltage with which discharge starts in said discharge cell.

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